

**H.R. 2772, “THE JOHN RISHEL  
GEOTHERMAL STEAM ACT  
AMENDMENTS OF 2003”**

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**LEGISLATIVE HEARING**

BEFORE THE

SUBCOMMITTEE ON ENERGY AND  
MINERAL RESOURCES

OF THE

COMMITTEE ON RESOURCES  
U.S. HOUSE OF REPRESENTATIVES

ONE HUNDRED EIGHTH CONGRESS

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## **LEGISLATIVE HEARING ON H.R. 2772, "THE JOHN RISHEL GEOTHERMAL STEAM ACT AMENDMENTS OF 2003"**

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**Tuesday, July 22, 2003  
U.S. House of Representatives  
Subcommittee on Energy and Mineral Resources  
Committee on Resources  
Washington, DC**

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The Subcommittee met, pursuant to notice, at 2:15 p.m., in room 1324, Longworth House Office Building, Hon. Jim Gibbons, Vice Chairman of the Subcommittee, presiding.

Present: Representative Gibbons.

Mr. GIBBONS. The Subcommittee on Energy and Mineral Resources will come to order. The Committee is meeting today to hear testimony on H.R. 2772, The John Rishel Geothermal Steam Act Amendments of 2003, to amend the Geothermal Steam Act of 1970 to promote the development and use of geothermal resources in the United States.

Under Committee Rule 4(g), the Chairman and the Ranking Minority Member can make opening statements. If any members have other statements, they can be included in the record under unanimous consent.

Let me begin now making my opening remarks, and at any point in time if Mr. Kind, the Ranking Minority Member, shows up, we will allow him to enter his remarks as well. Or if anybody wants to submit an opening statement, they can, for the record.

### **STATEMENT OF THE HON. JIM GIBBONS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEVADA**

Mr. GIBBONS. The Subcommittee meets today to discuss an important piece of legislation that will make America more energy independent and help prevent future spikes in energy prices. H.R. 2772, The John Rishel Geothermal Steam Act Amendments of 2003, provides significant changes to existing law that will undoubtedly make geothermal energy use more attractive and increase our energy supply.

While substantial amounts of geothermal energy are currently utilized in the United States, the potential for greater use of geothermal energy is significant. In fact, according to the U.S. Geological Survey and Geothermal Energy Association, production of electricity from geothermal steam could increase by a factor of eight

over the next 20 years. That, ladies and gentlemen, is a significant contribution to our energy demand.

There is also enormous potential for direct use of geothermal energy for commercial and residential applications. America is not making full use of its geothermal potential because we don't have adequate incentives to attract needed capital investment to geothermal energy projects. Most of the potential geothermal resources for both electrical generation and direct use lies on Federal lands. But unlike other energy projects, access to geothermal resources on Federal lands involves a complex process of leasing and permitting. At the same time, the current royalty structure for geothermal development is inadequate and is preventing geothermal energy from meeting its full potential.

H.R. 2772 amends the Geothermal Steam Act by addressing a number of its inadequacies. The legislation applies common-sense solutions to current law in order to make geothermal energy production more attractive and less burdensome.

H.R. 2772 takes the Federal Government out of the business of determining where high-value resources are located and makes geothermal leasing market-driven through competitive bidding. It promotes a unified ownership of a single geothermal resource by directing that multiple leases located on one geothermal reservoir be offered for sale as a block.

This bill addresses the current backlog of geothermal lease applications by requiring these applications to be cleared within 1 year of enactment and allows applications to pay up front for needed processing, analysis, or documents to complete the process. To break the gridlock for leasing on Forest Service lands, this legislation directs the Forest Service and BLM to develop a common policy with specific steps for leasing, processing, and permitting geothermal projects on Federal land.

The bill also directs a review of moratoria and withdrawals from geothermal leasing on Federal lands and directs USGS to complete a new national geothermal resource assessment. To create certainty and make geothermal production on Federal lands more attractive, the bill makes a number of changes to the current royalty structure. It basis future royalties on a gross proceeds formula, making the system less complex, benefiting producers as well as State and local Governments.

The system will provide a uniform royalty structure. The payments will be lower for the first 10 years, and then increase thereafter for the duration of the lease. State and local Governments will begin receiving royalties earlier and receive an overall increase in their royalty share. And that is important to know, because many local Governments have been concerned that we would be decreasing or eliminating their royalty share, and they will actually begin to receive these royalties earlier and will receive an overall increase in their royalty share in the long run.

This bill directs a 25 percent share of the royalties to the county Government so that local communities receive their direct revenue from local projects. To encourage geothermal energy use by farmers, ranchers, local Governments, and small business, H.R. 2772 establishes a simpler leasing process and more attractive terms for direct use of geothermal heat.

Finally, this legislation encourages geothermal production on appropriate military lands by providing lessees with the same terms for production that apply on other Government lands. Overall, the changes to the Geothermal Steam Act will greatly reduce the complexity faced by geothermal energy producers and users under the current regime. H.R. 2772 should make production of this clean, renewable, and domestic resource more attractive, thus boosting our energy supply and helping local communities, families, and economies.

We are facing an energy supply shortage in this country that is costing jobs and threatening to hurt every aspect of the American economy. We need sound energy policy that boosts domestic supply by allowing the private sector to better utilize the abundant resources that we have on Federal lands.

And finally, let me just add that H.R. 2772 was named for John Rishel, who many of you knew for his hard work and years of dedication on this Committee staff. John believed in common-sense approaches to utilizing resources on Federal lands. John was a geologist by training, and he worked very hard on this legislative language and on other initiatives that would allow the best use of our Federal energy and mineral resources.

I am proud to honor John's hard work and dedication with this legislation. I am hopeful that this Committee can act expeditiously on H.R. 2772 so we can better support the domestic production of a clean alternative energy to help us meet the ever-growing energy needs of our 21st century Nation.

[The prepared statement of Mr. Gibbons follows:]

**Statement of The Honorable Jim Gibbons, a Representative in Congress  
from the State of Nevada**

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While a substantial amount of geothermal energy is currently utilized in the U.S., the potential for greater use of geothermal energy is significant. In fact, according to the U.S. Geological Survey and Geothermal Energy Association, production of electricity from geothermal steam could increase by a factor of eight over the next 20 years—that is a significant contribution. There is also enormous potential for direct use of geothermal energy for commercial and residential applications.

America is not making full use of its geothermal potential because we don't have adequate incentives to attract needed capital investment to geothermal energy projects. Most of the potential geothermal resources, for both electricity generation and direct use, lies on Federal lands. But like other energy projects, access to geothermal resources on Federal lands involves a complex process of leasing and permitting. At the same time, the current royalty structure for geothermal development is inadequate and is preventing geothermal energy from meeting its full potential.

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I am proud to honor John's hard work and dedication with this legislation.

I am hopeful that this Committee can act expeditiously on H.R. 2772 so we can better support the domestic production of a clean, alternate energy to help us meet the ever growing energy needs of our 21st century nation.

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Mr. GIBBONS. With that, let me welcome our first panel, Patricia Morrison, Deputy Assistant Secretary of the Interior for Land and Minerals Management, Department of the Interior.

And Secretary Morrison, let me have you rise, stand and raise your right hand, because we have a policy and a procedure in this Committee of swearing our witnesses in. So if you would please raise your right hand and repeat after me.

[Witness sworn.]

Mr. GIBBONS. Let the record reflect that the witness answered in the affirmative. And Madam Secretary, at this point in time, let me welcome you to the Committee. It is a pleasure to have you here. We look forward to your remarks. The floor is yours. And please, if you prefer to summarize your statement and submit your complete written statement for the record, by all means, that is the preferred way to do it. But we will allow you to make whatever statement you wish to make at this time. Madam Secretary, the floor is yours.

**STATEMENT OF PATRICIA MORRISON, PRINCIPAL DEPUTY  
ASSISTANT SECRETARY FOR LAND AND MINERALS MANAGE-  
MENT, U.S. DEPARTMENT OF THE INTERIOR**

Ms. MORRISON. Thank you, Congressman Gibbons. And I would address the other members of the Subcommittee, but they are not here.

Thank you for inviting me to testify on this, and I would like to submit my written testimony in total and simply give you a summary of what is in that testimony.

Mr. GIBBONS. Without objection, Madam Secretary, it will be done.

Ms. MORRISON. Thank you. I am pleased to appear before you this afternoon to discuss the Bureau of Land Management's, or BLM's, geothermal leasing program and the efforts that BLM is taking to enhance that particular energy production program from Federal lands.

However, as you noted Congressman Gibbons, I would like to take an opportunity to acknowledge Mr. John Rishel, who worked on the House Resources Committee. We support the Committee's recognition of Mr. Rishel by gracing his name with this bill.

John has established, or had established a great working relationship with the Minerals Management Service as well as the Bureau of Land Management. He always represented the Committee well on various matters and issues, particularly when it came to the language he developed for the comprehensive energy bill. Mr. Rishel, as you noted, had a personal interest in the geothermal section of the bill and put a great deal of effort into making sure he contacted all of the parties to gather and collect everyone's views.

We agree that it is appropriate to honor him and his memory, and recognize his dedication to this work.

Generally speaking, the Department of Interior believes that H.R. 2772 will provide support to promote geothermal production, which is the focus and the intent of BLM's program. However, we received this bill just this past Thursday, on July 17th, and have not had sufficient time to analyze the bill with regard to royalty issues of MMS, BLM leasing programs, as well as USGS studies, and are unable today to present a formal administration position on the bill.

However, once we have reviewed the bill, we would be happy to discuss it with the Committee and any of its members. Thus, I will be confining my remarks to discussion of the BLM's existing geothermal program.

The President's national energy policy encourages a diversification portfolio of domestic energy supplies. It provides the building blocks, we believe, in order to provide that diverse portfolio so that we can rely less on foreign sources. As a component of that diversified portfolio, the renewable energy can provide for our future energy needs an abundant, clean, and naturally occurring source of energy, such as is shown in geothermal, the heat of the earth.

Renewable energy supplies diversify our portfolio, but they do it with very few adverse environmental impacts. We believe that an increased development of these domestic renewable resources can help alleviate or provide a safety valve for some of the Nation's problems associated with over-reliance on foreign energy supplies.

The national energy policy of the President further directs the Department of Interior and Energy to reevaluate the access limitations to Federal lands in order to increase the renewable energy production, such as geothermal. Also, it directs the Department of Interior to reduce the delays in geothermal leasing and processing as it is part of that permit review process.

Pursuant to the Geothermal Steam Act of 1970, the BLM is responsible, as you know, for leasing these geothermal areas, developing them, and processing the permit applications. This authority that the BLM holds responsibility over encompasses approximately 700 million acres of Federal minerals. Those minerals underlie BLM lands, Forest Service lands, other Federal lands, as well as split-estate lands, where the private land is owned by an individual and the mineral rights are retained to the U.S. Government.

However, for lease applications to the Forest Service lands, the Geothermal Steam Act requires the Forest Service's concurrence with the BLM lease issuance. BLM administers about 400 geothermal leases, and those 400 leases represent approximately 400,000 acres of Federal minerals. The royalties for 2002 were almost \$13 million, and 50 percent of those royalties, as per our royalty scheme, is returned to the States—some of which then filters into the counties' budgets. Those are in the areas or counties where the geothermal energy is actually produced.

As the Committee may already be aware, Secretary Norton is committed to renewable energy and chaired a renewable energy conference in November of 2001, here in Washington, D.C. Several of those topics that were discussed at that conference included permitting, leasing, public land access, and the need for updated geothermal resource assessments.

I have brought with me today a copy, or several copies, including a CD, of a document co-authored by the Department of Energy and the BLM, "Opportunities for Near-Term Geothermal Development on Public Lands in the Western United States." This is a document which identifies in a color-coded fashion those areas of high, medium, and low potential for geothermal resources. I submit to the Committee today these copies.

The report identifies approximately 18 of the BLM planning units that have what are characterized as high near-term geothermal power potential. Those are in 18 planning units for BLM. And what that does for the Federal Government and the industry is it allows them to concentrate those efforts that are most probable for leasing and exploration.

With this, Chairman Gibbons, I would look forward to working with the Subcommittee, with our bureaus—USGS, BLM, and MMS—in its continued efforts to implement the national energy policy with regard to this particular renewable energy resource. And I do thank you for the opportunity to testify before you today.

[The prepared statement of Ms. Morrison follows:]

**Statement of Patricia Morrison, Principal Deputy Assistant Secretary for Land & Minerals Management, U.S. Department of the Interior**

Madam Chairman and members of the Subcommittee, I am pleased to appear before you this morning to discuss the Bureau of Land Management's (BLM's) geothermal leasing program and efforts the BLM is undertaking to enhance geothermal energy production from Federal lands.

The Department of the Interior generally believes that H.R. 2772 will provide support for these efforts. However, as the bill was introduced on July 17th, we have not had sufficient time to fully analyze the legislation and to develop a formal Administration position on the bill at this time. After we have had more time to review the bill, we would be happy to discuss its provisions with the Committee. Thus, I will be confining my remarks to a discussion of the BLM's existing geothermal program.

The President's National Energy Policy encourages a clean and diverse portfolio of domestic energy supplies. Renewable energy can help provide for our future energy needs by harnessing abundant, clean, naturally-occurring sources of energy—such as the heat of the Earth. Renewable energy supplies not only help diversify our energy portfolio, but they also do so with few adverse environmental impacts. Increased development of these domestic renewable resources also can help alleviate the Nation's problems associated with an over-reliance on foreign energy supplies.

The President's National Energy Policy further directs the Departments of the Interior and Energy to re-evaluate access limitations to Federal lands in order to increase renewable energy production, such as geothermal energy. It also directs the Department of the Interior to determine ways to reduce the delays in geothermal lease processing as part of the permitting review process.

#### *Geothermal Energy Background*

Geothermal energy is heat derived from the earth. It is the thermal energy contained in the rock and fluid that fills the fractures and pores within the rocks of the Earth's crust. Geothermal resources, in localized underground areas of steam or hot water called reservoirs, are available in several western states. The highest temperature resources are generally used for electric power generation. Low and moderate temperature geothermal resources can be used for greenhouses, aquaculture, industrial processes, and heating of buildings, including municipal buildings and schools.

According to the U.S. Geological Survey, over 22,000 Megawatts of power could be generated from the geothermal resources of the United States. This would be enough power to satisfy the needs of over 22 million homes for more than 30 years. Existing geothermal power plants in the United States currently have a total capacity of 2700 Megawatts, 43% of which receives energy from geothermal resources on Federal lands.

#### *BLM's Geothermal Program*

The BLM, pursuant to the Geothermal Steam Act of 1970, is responsible for leasing Federal lands for geothermal development and processing permit applications. This authority encompasses approximately 700 million acres of Federal minerals, including BLM lands, National Forest System lands, and other Federal lands, as well as private lands where the mineral rights have been retained by the Federal Government. For lease applications on Forest Service lands, the Geothermal Steam Act, as amended, requires Forest Service concurrence prior to BLM lease issuance.

The BLM currently administers 400 geothermal leases, encompassing over 520,000 acres of Federal minerals. The BLM's geothermal program has 56 producing leases. Much of the geothermal activity on Federal lands takes place in California and Nevada. California has 86 leases, 25 of which are producing. Nevada has 242 leases, 28 of which are producing. More than 80% of the electrical generation from Federal geothermal resources occurs in California. Other states with Federal geothermal leasing activity include Utah, New Mexico and Oregon. The BLM supervises 29 power plants using Federal resources in California, Utah and Nevada. These Federal resource power plants have a total capacity of 1,148 Megawatts, which can supply the needs of over one million homes. Annual royalties from geothermal production exceeded \$15 million in 2002, with 50% of that royalty income being returned to the states—and, at times, the counties—in which the energy was produced.

Over the last two years, both the Federal Government and industry have expressed renewed interest in geothermal energy development. The BLM received twice as many new geothermal leasing applications—approximately 100—over the last four years than it received over the previous ten year period. During the last two years, the BLM has issued about 150 geothermal leases, covering almost 250,000 acres. There are currently approximately 230 pending Federal geothermal lease applications—about 125 of these are on Forest Service lands and about 105 are on BLM lands.

The BLM's 2003 geothermal program budget includes \$700,000 in base funding and an additional \$700,000 in targeted funding for environmental reviews related

to geothermal lease processing in the State of Nevada. The President's 2004 Budget requests \$1.2 million in base funding for the BLM's geothermal program.

*Ongoing BLM Efforts to Enhance the Geothermal Development*

In November, 2001, Secretary of the Interior Gale Norton chaired a Renewable Energy Conference in Washington, DC, that brought government officials together with renewable energy and environmental leaders and other citizens to focus on the best ways to increase renewable energy development—including geothermal—on the public lands. Topics discussed at the conference included permitting, leasing, public lands access, the need for an updated national geothermal resource assessment, and other regulatory matters.

As a result of the conference, and in support of the President's National Energy Policy, the Departments of the Interior and Energy organized a National Geothermal Collaborative of Federal and non-Federal stakeholders. The Collaborative has been meeting to advance strategies to enhance geothermal production, including identifying and reducing impediments to development and establishing dialogue with key stakeholders. The Collaborative is in the process of completing reports analyzing the impediments to accessing geothermal resources on Federal lands; analyzing Renewable Portfolio Standards (whereby States mandate a certain percentage of renewable energy supply into power grids); as well as other geothermal energy reports.

In addition, in April of this year, the BLM and the Department of Energy, through its National Renewable Energy Laboratory in Colorado, released a report entitled "Opportunities for Near-Term Geothermal Development on Public Lands in the Western United States." The report identifies and provides information related to 18 BLM Planning Units with high, near-term geothermal power development potential, so that industry and the Federal Government can concentrate their efforts for geothermal leasing and exploration in these areas.

Finally, the BLM also recently completed a customer satisfaction survey of industry, government, and other interested non-governmental representatives who have shown an interest in the Federal geothermal program. The survey was intended to measure BLM's success at meeting the concerns and suggestions from the 2001 Renewable Energy Conference. The BLM is incorporating the information provided through this survey into its efforts to facilitate geothermal development and to improve its business practices.

*Conclusion*

Madam Chairman, we look forward to continuing to work with the Subcommittee as the BLM continues its efforts to implement the President's National Energy Policy to promote renewable energy development from Federal lands. Thank you for the opportunity to testify before you today. I welcome any questions the Subcommittee may have.

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[NOTE: The U.S. Department of Energy report entitled "Opportunities for Near-Term Geothermal Development on Public Lands in the Western United States" submitted for the record by Ms. Morrison has been retained in the Committee's official files.]

Mr. GIBBONS. Thank you very much, Madam Secretary. We have, obviously as you have heard, another wonderful excuse to recess, but we are going to take some time here to ask some questions.

Let me ask, first of all, with regard to the Department's assessment of the problems right now, the backlog of processing of geothermal lease permits and applications, have you attempted to identify what the impediments are within the Department to going forward with an effort to reduce the number of backlogs or the number of permits that are on backlog with you?

Ms. MORRISON. I can address that in way of a track record, Congressman, and that is over the last 12 months from today—12 months hence, or back, the BLM itself has processed approximately 100 of those leases. So yes, we are putting efforts forth in order to alleviate that backlog. Yes, sir.

Mr. GIBBONS. Do you know how many you have on backlog today?

Ms. MORRISON. I will not quote you a number, but I can get that for you.

Mr. GIBBONS. Do you have an estimate?

Ms. MORRISON. I believe it is around 230, sir.

Mr. GIBBONS. OK. So as of a year ago, what would that number have been, before you started this overall effort to expedite some of these permitting applications? Do you have a number back what it would have been a year ago?

Ms. MORRISON. Well, I think if you add the 230 and the 100, you get about 330, so—

Mr. GIBBONS. So—OK.

Ms. MORRISON. And keep in mind, not all of those—

Mr. GIBBONS. That is not a stagnant number, either.

Ms. MORRISON. It is not a stagnant number.

Mr. GIBBONS. That number changes because you will process 100, you may get another X number submitted to you for application as well.

Ms. MORRISON. Some drop in, some drop out.

Mr. GIBBONS. What is the average number per year of applicants you get?

Ms. MORRISON. That is going to be a moving target as well, since this is a new resource.

New applications in the last 3 years, approximately 150.

Mr. GIBBONS. OK. So about 50 a year.

Ms. MORRISON. Well, we averaged that out.

Mr. GIBBONS. That would be an average that you get. So if we look at the number 230 now, we are looking at somewhere between five and 10 years at 50 a year, average, to get rid of the backlog plus take care of the—some that are coming in on each year. If you get 50 a year, you have done 100 this year in the last 12 months, you have a period of time within which you have to reduce the backlog?

Ms. MORRISON. Correct.

Mr. GIBBONS. What, since you have been doing a greater number, you have done 100 over the last 12 months, as you have said, what steps are included in that expedited process that you can identify that have resulted in your handling of 100 permits in the same permitted time line that you normally do 50?

Ms. MORRISON. I have to take an educated guess at that, and I—my experience has been that a refocusing of the BLM on this particular resource is what has caused that movement ahead.

Mr. GIBBONS. So in other words, they have been challenged with other demands on their time limit or in their departments looking at other minerals, whether it is hard rock, coal, or surface permitting for grazing or whatever, and geothermal just came in there at a distant—

Ms. MORRISON. I think it has probably just been a refocused effort on the energy and the national energy plan specifically identified this as an area that we did need to focus on and have done so.

Mr. GIBBONS. Do you feel there are any additional steps that you can take that would help expedite this process, in addition to what you have done already?

Ms. MORRISON. I don't know specifically. I think—

Mr. GIBBONS. Well, does the Department lack adequate resources today to continue with what you are doing on an expedited basis, refocusing, applying more personnel/manpower, so to speak, on this issue—do you have the adequate resources to do that?

Ms. MORRISON. To give you a little bit of a backdrop to answering that question, in 2003, we asked for \$700,000; 2004, we asked for an additional \$550,000. It seems as though our geothermal program is doubling itself as we go along. In addition to that, USGS has asked for \$500,000 in 2004, for additional monies that they need, and I believe that is about a half or a third of the total amount they need, as I mentioned, to reassess the geothermal resource areas. And that in particular is very helpful, not only to the BLM land managers in managing their resource management plans, which are the basis for this leasing, but it also gives the industry the information they need in order to get financing.

So for instance, if I were an industry applicant and I have a lease that I purchased from BLM, to go to a bank and get financing to actually put in a geothermal plant, the question is asked, what resource to you have to back up this money? So it is sort of a reliance, if you will, on each other. The leasing relies on the information, the information is relied on by industry to get financing, the financing produces more geothermal.

Mr. GIBBONS. Now, you mentioned in your testimony that you have a term “high, near-term geothermal potential,” I believe.

Ms. MORRISON. Yes, sir.

Mr. GIBBONS. Does that language replace the KGRA, or known geothermal resource areas?

Ms. MORRISON. No, it does not. This is additional information.

Mr. GIBBONS. OK. All right. Are you contemplating, or does your analysis show that there is in the competitive leasing program an effort to move away from the known geothermal resource area determinations?

Ms. MORRISON. Again, as I mentioned, because specifically for that financing reason and for the land-use planning reason, we are not moving away from that known geothermal resource area. However, we have not done an extensive analysis of competitive leasing. I think that the known geothermal resource area information is of a—it is significant information that industry and the BLM relies on. Tying it to the competitive lease sale arena is not necessarily something that needs to happen. In my mind, there is not a definite tie between those two, but I don’t know that at this moment in time we can just simply do away with the known geothermal resource areas.

Mr. GIBBONS. Madam Secretary, as you know, this bill attempts to unify the process and procedures, depending upon Federal land versus Department of Defense land.

Ms. MORRISON. Yes, sir.

Mr. GIBBONS. Now, in your experience, what is the process that BLM uses when it deals with non-geothermal resources when it comes to minerals, oil and gas, whether it is on DOD or Federal land? Are they different or are they similar?

Ms. MORRISON. They are different. And in the other arena, the non-geothermal resource arena, BLM is the land managing leasing agent for those minerals. The military lands perhaps might be

withdrawn. If they are, then of course there is not going to be any leasing on it. Otherwise, there could be. And BLM would be the land managing leasing agent.

Mr. GIBBONS. So under that scenario, the terms of a gas or oil lease or a coal lease on land that is DOD as well as Federal, the terms are the same. Management is under one agency called BLM, rather than DOD and BLM, if it crosses the border?

Ms. MORRISON. Correct, although I will make a note and I will check this just to make sure, but I don't believe there is any coal leasing on military lands presently.

Mr. GIBBONS. Yes.

Ms. MORRISON. Yes.

Mr. GIBBONS. OK. So under geothermal today, if it is on DOD land, DOD geothermal is managed and regulated by DOD, not by BLM?

Ms. MORRISON. Yes, sir.

Mr. GIBBONS. And that means that DOD has a different set of criteria for leasing than it would be if it were on BLM land right next door.

Ms. MORRISON. Correct.

Mr. GIBBONS. In your opinion, would it be better to have a uniform concept or approach to leasing, whether it is DOD or BLM land sitting right next door?

Ms. MORRISON. Let me answer that from a geological perspective, having had my background in the offshore and the oil and gas business. We are talking about a resource that can be depleted. Although we term it renewable, that is true if managed correctly. You have one resource, and whether the wells be drilled on Federal land, be it military or BLM or Forest Service, State land, or private land, you have one resource that underlies the ground.

What BLM is interested in is the management of that particular resource such that it is not prematurely depleted and that it is managed correctly so that we have the maximum amount of electricity, say, produced from that geothermal resource in a way that—for instance, you may re-inject the water in order to continue to have that resource renewed. To me, it is an issue of resource management.

Mr. GIBBONS. OK. So what you are saying here is if you have a common, unified pool of geothermal resource under the ground, and the ground just happens to be divided arbitrarily on the surface—one half being DOD, one half being BLM—that there could be a management difference between how that resource is utilized under a DOD contract, two inches away by an arbitrary line, from a BLM contract on the other side of the fence, which could adversely change how the resource is utilized and/or protected in the long run?

Ms. MORRISON. In theory, yes, you are correct. And that is no different than an oil and gas reservoir that perhaps gets drained by State leases.

Mr. GIBBONS. And this is why, under oil and gas, you have a uniform management system that applies to both DOD and BLM, or Federal land outside of DOD?

Ms. MORRISON. I am not going to presume why that is, but that is the way it is. But you still have the issue of State and private

drainage. Under your oil and gas example, you still have that kind of conundrum.

Mr. GIBBONS. Precisely. Precisely.

Madam Secretary, the staff has presented a number of questions with regard to the bill. And most of them have to do with the technical aspect of the bill with regard to royalties, near-term production incentives, credits for in-kind payment of electricity, et cetera, that I would like to submit to you, and if we could get you to respond to them, so that we can make any adjustments in our bill with an administrative point of view as to if there are problems with those. And we will submit those questions to you.

Ms. MORRISON. We would be happy to work with you and respond to those.

Mr. GIBBONS. Very good.

Is it time to conduct a new assessment of our geothermal resources in America?

Ms. MORRISON. Yes.

Mr. GIBBONS. Why do you say that?

Ms. MORRISON. My understanding is, is the last known geothermal resource area assessment by the USGS was in 1970, formal assessment. The budgetary 2004 \$500,000 monies that I mentioned to you is a movement by USGS—and again, I can't recall if that is half or a third of their total budget for that reassessment.

Mr. GIBBONS. Now, will the new reassessment, if you go forward with one, take into consideration the changes in technology that had been advanced in geothermal recognition or design and development over the last 30-some years?

Ms. MORRISON. Yes, sir.

Mr. GIBBONS. Do you have the resources needed to, or additional funding to do such an assessment?

Ms. MORRISON. Again, I will put it in terms of the budget. We have asked for \$500,000 at USGS. If that represents a half or a third, then they have still got two-thirds or another half to go. So that is the funding situation at hand.

Mr. GIBBONS. So we need to continue working on getting the adequate funding and authority for you to do the assessment with the right amount of resources.

Ms. MORRISON. Correct.

Mr. GIBBONS. Let me step back, if I may, Madam Secretary, and go back to the issue of divided estates, fragmented estates, and ask you a question just with regard to ownership, where ownership of an undeveloped geothermal reservoir is fragmented and—or is fragmented between multiple parties. Do you feel you have the adequate authority to establish lease unitization or pooling of these activities?

Ms. MORRISON. I do not believe we have that authority. I will double-check that, but I do not believe we have that unitization authority at this date.

Mr. GIBBONS. Would you submit to us your recommendation to deal with fragmented estates in that area?

Ms. MORRISON. Certainly. We would be happy to do that.

Mr. GIBBONS. —look at that if we could.

Ms. MORRISON. Do you want that as part of your questions?

Mr. GIBBONS. Yes. Anything that you feel that you want to submit for the record today or within the next couple of weeks would certainly be included and we would like to review that, especially the questions that we are going to submit to you, the administration questions for review of the bill itself.

Ms. MORRISON. We would be happy to do that.

Mr. GIBBONS. Knowing, of course, that you have only received the bill last Thursday when I put it in the hopper. So being here today is indeed a remarkable comment on your favorable appearance here to be able to testify on the issue before the Committee. Many times people say that Friday is just not enough time to be back on Tuesday to testify what this bill does. And I certainly appreciate that.

Of the hundreds of direct use projects for using geothermal, and that means—direct use would be the heat exchange, et cetera—only three are located on Federal lands. Why do you feel that we have so few direct use geothermal projects on Federal land when a large amount of our geothermal energy is generated on Federal lands?

Ms. MORRISON. My understanding is that the royalty scheme for that direct use perhaps is not as sorted out as it should be.

Mr. GIBBONS. So it would be burdensome or cost prohibitive?

Ms. MORRISON. That is my understanding. And I also understand that the technology of using those lower-temperature geothermal resources, such as in the 120- to 150-degree range, that the technology for those uses are becoming more commercial. So as we go down the road, there is less of a distinction between direct use and commercial use.

Mr. GIBBONS. Yes, and I can understand it. In Nevada, we have several geothermal plants which are used for drying onions, not producing electricity. So there is a direct use of using heat to dry farm products and produce something that is commercially acceptable—as well as heat homes. Because in Nevada we have a large number, in fact the home I used to live in before I live in the one today had a geothermal well that heated the home and heated the swimming pool—although I will never have another swimming pool—it heated the swimming pool with geothermal energy. So, and that was something that I really felt fortunate to have. And many communities in Nevada—Elko, Nevada, uses a lot of the geothermal energy in that low temperature range, 120 to 150 or so degrees, to heat their Government buildings.

Ms. MORRISON. Right.

Mr. GIBBONS. So we are trying to take and utilize as much of this valuable resource as we possibly can.

Let me ask you a question with regard to calculating royalties. Would a gross proceeds method be less complex than the current net back method? And if you could explain the difference between a net back method for us and what you think is a gross proceeds royalty and how it would be calculated.

Ms. MORRISON. I am going to do it in pretty basic terms, so here we go.

Mr. GIBBONS. There is only one basic person here for you to talk to, so—[Laughter.]

Well, Mr. Basic, here we go. The net back method, let's start with that. Basically you have a power plant generation facility. Net back takes your total operating cost, deducts it from your receipts, if I can use that term, and comes up with a profit figure. That is a rather detailed accounting function, and they are expensive. It is basically—

Mr. GIBBONS. Does it require an auditing process for you to comply with?

Ms. MORRISON. It does require an auditing process. It also requires, if you will, a second set of books. So you may actually spend—in certain anecdotal examples, I have heard that you can actually spend more on the accounting function and the second set of books and the auditing function than on the actual royalty paid.

Mr. GIBBONS. Let me ask you about the Calpine lease. How is the royalty calculated on the Calpine lease?

Ms. MORRISON. I am going to have to defer to that. I was not aware that we had a gross proceeds lease until just this morning. That was—

Mr. GIBBONS. OK. But can't you tell me how that works in comparison to the net back proceeds process?

Ms. MORRISON. My brief understanding, subject to check, is that it is on a gross proceeds basis. In other words, it is a percentage of the total gross proceeds, as metered to the grid. But we will get you the specifics on that.

And just to finish up the comparison to the gross proceeds method is very simplistic. You meter it at the grid, you multiply the amount of geothermal energy going through there converted to electricity, times the sales price, and you take a percentage off the top.

Mr. GIBBONS. OK. And that is a much simpler form when it comes to accounting—

Ms. MORRISON. Yes.

Mr. GIBBONS. —or even for those people that are depending upon that royalty to calculate, rather than have to go through the double set of books, the determination what is deductible and what is not deductible.

Ms. MORRISON. Right.

Mr. GIBBONS. It is kind of the difference between a flat tax and the current system of taxes we have today that allow for a complicated process where only the attorneys make money in the process.

Ms. MORRISON. Not to mention you have already calculated the figure in your sales contract price.

Mr. GIBBONS. Yes.

This bill authorizes the Secretary to give companies royalty credits where they enter into an agreement with a State or county Government for an in-kind sale of electricity. If enacted, how would this affect revenues?

Ms. MORRISON. Again, as I said in my opening comments, I am not in a position to comment specifically on that. If we can make that part of our questions, I am sure we can analyze that for you.

Mr. GIBBONS. We will submit that and other questions for you as well.

Ms. MORRISON. All right.

Mr. GIBBONS. The review of moratoria and withdrawals from geothermal leasing on public lands, and ensures Congress—well, let's see, this bill requires a review of that moratoria and ensures Congress and the Secretary of Interior have oversight over such closures. Does the administration support this procedure?

Ms. MORRISON. As set out in your bill?

Mr. GIBBONS. Yes.

Ms. MORRISON. Again, I am going to have to defer an answer to that separately.

Mr. GIBBONS. OK. All right.

Madam Secretary, you have done a remarkably good job of coming here after 2 days' notice and being able to testify on issues and provisions of this bill. I have no further questions at this point in time. I believe that I have just about every question I can think of, and you have answered them superbly. Hopefully, we can hear back from you as soon as possible with the questions we will submit to you. Also, with regard to your analysis and recommendation for any technical changes that you think, in the bill, are required to better analyze this bill. We would appreciate your getting back those issues to us in the shortest possible time. And we look forward to working with you on that.

With that, Madam Secretary, I am going to excuse you, since there is no one else here to ask you a question. And I am sure that they couldn't ask a question that you couldn't answer. So I am going to excuse you, Madam Secretary. Thank you for your presence, and we will call up the second panel.

Ms. MORRISON. Thank you, Congressman.

Mr. GIBBONS. Thank you.

Mr. GIBBONS. The second panel is going to consist of Karl Gawell, Executive Director, Geothermal Energy Association; Dr. James Witcher, New Mexico State University; and Ms. Jeanne Connelly, Vice President, Federal Relations, Calpine.

And ladies and gentlemen, before you sit down, let me begin the same process that I started with the good Secretary and ask you to stand for the oath. After you get seated will be fine.

[Witnesses sworn.]

Mr. GIBBONS. Let the record reflect that each of the three witnesses answered in the affirmative.

As I understand, Mr. Gawell, you will be leading off the testimony. Mr. Gawell is the executive director of the Geothermal Energy Association. Mr. Gawell, I hope I have pronounced your name correctly. Welcome to the Committee. The floor is yours.

As I explained to you, we try to limit your testimony to 5 minutes so that we can get a summary of what you have to say. Your complete and written testimony will be entered into the record without objection. And if you run over it, that is OK. You know, it is just us. But we try to show some respect for everybody else that has to testify, so if you talk for an hour, I am going to ask you to wrap up. So try to be time-conscious in all for this for the Committee as well.

Mr. Gawell, welcome. The floor is yours.

**STATEMENT OF KARL GAWELL, EXECUTIVE DIRECTOR,  
GEOTHERMAL ENERGY ASSOCIATION**

Mr. GAWELL. Thank you, Mr. Gibbons. It is a pleasure to be here.

In a sense, I want to talk to the larger issue for a minute. And I think this is almost preaching to the choir, knowing your background, Mr. Gibbons, but my testimony is—covers a lot of the details of the legislation. But I think the context is something I think we all have to pay attention to and everybody on the Subcommittee and Committee has to pay attention to.

I am a member of the Board of Directors of the American Council for Renewable Energy. And we had our annual meeting here in town last week. And former CIA Director Jim Woolsey was one of our speakers, along with Bud McFarland and several other people, talking about, in a sense, the change that has occurred, because there has been a fundamental change that has occurred in energy policy in this country. And his point was simple. He said we are in a war, we may be in it for awhile, and it is time America addressed some of its bad habits.

And I think that is sort of an underpinning push that we haven't had. Because things have changed. I have been doing energy policy—I looked at the room here and I think I have testified before every one of these chairmen. But there are some changes that have occurred that all of us had better face up to. One, we had never had a terrorist attack on American soil. I was reading Gary Hart's book, "A New Democracy," the other night. He talked about our energy problem and how bad it is. But he said, but the one thing we have never done yet, we haven't gotten to the bottom of the ladder because we haven't gone to war in the Middle East.

We have done that. And the other thing that has changed is—the next paragraph in his book said, well, everything is going to be fine because we have unlimited supplies of natural gas. I know you were in attendance at the Speaker's meeting yesterday saying what are we going to do about natural gas supplies in this country? We have tremendous demand going forward, but the supplies aren't there.

The underpinnings of virtually every energy policy in the last 20 years have changed in a fundamental fashion. And I don't think we have yet to understand how they are going to re-sort themselves. But as an American citizen and as a representative of American companies, I think that means learning to produce more from the resources we have in the country.

And one of those tremendous untapped resources is the heat of our earth, our geothermal resources. And when I look at what we are doing, I don't see us tapping those resources. I think the legislation we have today begins to address some of it. I want to add a footnote: There are other areas we need to go back and look at outside of this bill.

For example, I understand that for awhile 10, 15 years ago, we were looking at producing the geopressurized resource along Texas, Louisiana. That resource holds 50 times the U.S. energy use every year in methane. Twenty years ago, that looked uneconomical. Today, given our new reality, we might want to go back and look at it.

We have a huge resource in the West. The Geologic Survey thinks we have at least 20,000 megawatts of producible just electricity use, and direct use might be that much, it might more, that we could produce using geothermal resources in the West—if we could put things in the right order, which to us I think means, one, getting the economics straight. I think the Congress is looking at expanding the production tax credit and taking other measures to give investors the right signals. But the other part of that is to get the Federal programs straight. And the more we have delved into this whole issue over the last 2 years in the hearings before this Subcommittee and the full Committee, I think the more the industry has recognized that that also means getting the law straight.

And I think H.R. 2772 is a bill that takes us a long way toward getting that right. And frankly, point-blank, Mr. Gibbons, Mr. Chairman, we are 100 percent in support of your legislation. This bill will move forward and allow us to produce more geothermal resources in the West, both in terms of electricity and direct use, and help address our really urgent national security problems.

From my company's perspective, it is sort of almost a no-brainer. What's not to like? We are looking at legislation where the geothermal leasing program will become market driven through competitive lease sales. We are looking at legislation which will encourage development by promoting unified ownership of the whole reservoir up front. We see the pending lease application backlog being eliminated within a year, something we have been asking for repeatedly over the last years.

Use of geothermal resources by ranchers, farmers, small businesses, communities will be encouraged by new provisions that will create a simpler leasing process with less onerous terms for direct uses. And in addition to Elko, for example, the State capitol buildings in Boise have been heated, what, for 100 years, I believe, by geothermal resources. We should see more of that throughout the Western United States.

Your bill gives us Federal royalty requirements which are more predictable, less bureaucratic, and we will see more of the funds supporting local and rural economic development. And it also will allow State and local Governments to leverage their royalty funds and increase their income by negotiating in-kind royalty schemes with local producers.

We see a directive for the U.S. Geologic Survey to do a new nationwide assessment, which is urgently needed. In the last assessment for conventional geothermal reservoirs, it said we are cutting it off at 3 kilometers; we don't know what is beneath that. And the reason we are cutting it off at that point is we have no information. Today, just last week, it was announced the first geothermal plant in Germany of all places, which doesn't show up as a big red spot like Nevada does on the map, and they are producing that at below 10,000—deeper than 10,000 feet. So clearly, the drilling technology has changed. We are producing from much deeper reservoirs, so what was economic in 1970 has changed dramatically today.

We see a bill which eliminates major impediments to new development by giving clear authority to BLM to establish units and pools where there is fractured ownership.

We see the backlog on Forest Service lands being eliminated—a major move forward. There are tremendous resources under Forest Service lands. These aren't lands that are wilderness or that are roadless. We are looking at lands that should be part of our multiple-use forest system and could contribute to protecting the forest by protecting the environment through clean energy production.

We also see a bill that eliminates the current disparity in mineral production. You know, if you produce gold or silver from a geothermal well, you have to pay a royalty. If you produce it anywhere else on the public lands, you don't. Well, is that a big issue? I was just conferring with Roy Mead [ph] from the Department of Energy, and we were looking at some of the minerals that you might be able to produce from geothermal resources. And we are producing the very first now, which is zinc, as you know. But they are looking at zinc, silica, manganese, lithium, silver, gold, and rare earth elements. In many different geothermal systems, you will find those resources.

Of all of those resources, the one which we produce the most of in this country is gold. For most of the others, we now import most of our supply. And I love when you go to the USGS website and you look up rare earth elements, the title is Rare Earth Elements Critical for High Technology. And today, 90 percent of our rare earth elements come from imports, almost entirely from China. And they are basically a fundamental product for high technology in this country.

So I think we have a new source of producing minerals for our country, for our economy that can be done in an environmentally benign manner. I mean, what better way than to bring it out of your well and produce it without having to deal with mining it at all? And yet current law would discourage that by giving you disparate treatment.

And we are looking at legislation which will encourage geothermal production from appropriate military lands by placing them on the same basis as the Bureau of Land Management.

So in our view, we see this legislation as a major step forward that will really help promote the full range of uses of geothermal energy to help our Nation and the West move forward in the years ahead.

Thank you, Mr. Gibbons.

[The prepared statement of Mr. Gawell follows:]

**Statement of Karl Gawell, Executive Director,  
Geothermal Energy Association**

Mrs. Chairman and Members of the Subcommittee,

Thank you for the opportunity to present the views of members of the Geothermal Energy Association (GEA) regarding H.R. 2772, The John Rishel Geothermal Steam Act Amendments of 2003 introduced by Rep. Jim Gibbons (R-NV) and cosponsored by Representative Steve Pearce (R-NM). GEA is a trade association representing the full range of companies and organizations involved in the U.S. geothermal industry, from power plant owners and operators to small drilling and exploration companies.

*Geothermal Energy's Potential*

Geothermal energy provides a significant amount of the energy and electricity consumed in the Western U.S. Geothermal heat supplies energy for direct uses in commercial, industrial and residential settings in 26 states. Geothermal resources

furnish substantial amounts of electricity in California, Nevada, Utah and Hawaii. Indeed, 6 percent of California's electricity comes from geothermal energy.

Expanded use of geothermal resources will provide additional clean, reliable energy to the West. Thousands of megawatts of new geothermal power, and an equal amount of direct-use energy, could be developed in the immediate future with proper incentives, expedited regulatory processing and continued support for the development of new technology.

Geothermal energy contributes directly to both state and local economies and to the national Treasury. To date, geothermal electricity producers have paid over \$600 million in rentals, bonus bids and royalties to the Federal Government. Moreover, according to an analysis performed by Princeton Economic Research, it would be reasonable to estimate that the geothermal industry has paid more than 6 times that amount in Federal income tax, for a combined total of over \$4 billion.<sup>1</sup> If the economic multiplier effects were considered, the total contributions of geothermal energy to the local and national economy would be substantially greater.

What is the potential for geothermal energy on public lands? GEA believes the U.S. geothermal resource base could support significantly increased production. U.S. geothermal electric capacity, now at about 2,600 MW, could triple and, with expected improvements in technology, could reach nearly 20,000 MW in 20 years or less.

These figures would appear to be consistent with the estimates presented to the Subcommittee on Energy and Minerals by the U.S. Geological Survey. Their testimony indicated a potential for 22,290 MW of geothermal electricity production in the Western United States.<sup>2</sup>

#### *H.R. 2772*

GEA's testimony before the Resources Committee in March pointed out a series of issues that needed to be addressed to spur a revival in the use of our nation's geothermal resources.<sup>3</sup> A significant portion of those issues involved possible changes to the underlying Geothermal Steam Act of 1970. In many ways H.R. 2772 responds to our concerns in a constructive and responsible manner. It also goes beyond them to include provisions that would strengthen and clarify important parts of the geothermal law and improve how it supports state and local governments.

Before discussing some of the individual provisions of H.R. 2772, however, it is important to point out that some of the changes it proposes may cause some discomfort to individual GEA companies. Still, there is strong support for these provisions because they will encourage and promote development of geothermal energy resources in the United States. GEAs companies recognize the benefits of establishing a clearer, fairer law that facilitates and encourages new production of geothermal development on public lands.

#### *Competitive Leasing*

In GEA's view the move to a competitive leasing program that depends upon the market to determine high value leases will be a significant improvement over the current approach. Under existing law, the Secretary must determine which lands are high-value geothermal areas or "known geothermal resource area (KGRA)" and which are not. Both the law and BLM's regulations require that lands in KGRAs be leased only by competitive bidding while all others are leased noncompetitively.

The current law defines a KGRA as: "Section 1002 (e) known geothermal resources area means an area in which the geology, nearby discoveries, competitive interests, or other indicia would, in the opinion of the Secretary, engender a belief in men who are experienced in the subject matter that the prospects for extraction of geothermal steam or associated geothermal resources are good enough to warrant expenditures of money for that purpose."<sup>4</sup>

The existing statute gives the Secretary no discretion. If lands qualify as a KGRA they must be leased competitively. It is worth noting that the statutory language includes "competitive interest" as a factor that determines a KGRA, which implies that such determinations are made on a continuing basis, and in fact the BLM has made KGRA designations in areas with pending lease applications. But, it is not clear to me how one determines competitive interest with any certainty outside of holding a competitive lease sale. From a simply practical perspective, the Secretary

<sup>1</sup> Princeton Economic Research, Inc., Review of Federal Geothermal Royalties and Taxes, December 15, 1998. (Figures expressed in 1998 dollars.)

<sup>2</sup> See Table 2 attached.

<sup>3</sup> Statement of Karl Gawell, Executive Director of the Geothermal Energy Association, Before the House Committee on Resources, March 19, 2003.

<sup>4</sup> 30 USC Section 1001(e)

does not have the necessary staffing with the requisite expertise to administratively determine where high value geothermal resources are located.

As a result, large areas of the public lands have been leased non-competitively. But, even non-competitive lease applications are not met with any certainty. On several occasions, the Interior Board of Land Appeals has determined that it is the agency's obligation to cancel lease applications and place lands up for competitive bidding. For example, IBLA in its Decision Number 87-796 states: "A non-competitive geothermal resource lease offer must be rejected where the land is found to be within a known geothermal resources area prior to lease issuance and the offeror presents no evidence to show that the known geothermal resource area designation is in error." (See also, IBLA 84-212 and others similar decisions.)

GEA supports moving away from administrative KGRA designations to determine high value geothermal lands and supports the provisions of H.R. 2772 that would rely instead upon competitive bidding. Our views are prompted by the difficulty, delay and expense that making such administrative determinations entail, and the uncertainty that the current KGRA definition has caused for lease applicants. In effect, we support reforming geothermal leasing law along the lines that Congress reformed the on-shore oil and gas leasing laws. Under this approach industry would nominate areas that it was interested in leasing and all otherwise appropriate lands would then be put up for competitive bid. If lands received no bids, they would be available for non-competitive leasing for a couple of years. This approach relies upon competitive bidding, rather than agency determinations of KGRAs, to select high value lands and ensure a fair return to the taxpayer.

By making this important change, H.R. 2772 would be a significant improvement in the law and encourage greater use of geothermal resources throughout the West. It will simplify the leasing process, reduce BLM's administrative costs, and ensure a fair return to the taxpayer for publicly owned resources.

H.R. 2772 goes even further to promote new development by directing the BLM to offer leases for sale as a block in the competitive lease sale if they believe the leases involve the same reservoir. This will encourage successful development by promoting unified ownership of the resource. We believe this is an important addition to the competitive leasing program and will improve prospects for expanding geothermal production in the West.

An important remaining question is whether and how to deal with the 517,000 acres of pending lease applications. For the sake of the lease applicants, and the entire industry, we would like to see these lease applications addressed quickly. H.R. 2772 would direct the Secretary to process the pending lease applications within one year of enactment. After one year, a decision should be made to issue or reject the application. Otherwise the process should be underway to complete whatever studies or analysis is necessary for a prompt agency decision.

H.R. 2772 would achieve this by using the new authority it would give the Secretary allowing applicants to pay for necessary NEPA or other analysis and be reimbursed through royalty credits. Although this places some of the burden on the lease applicants, we believe it is a fair deal and necessary to clear out the application backlog.

#### *Direct Use Leases*

Geothermal resources also provide energy for significant agricultural, commercial, and other non-electric purposes in the US. Unfortunately, few of these direct-use facilities involve Federal geothermal leases. Kevin Rafferty of the Geo-Heat Center in Klamath Falls, Oregon stated, "The really telling statistic in my opinion is that we now have hundreds of direct use projects in operation across the West and we are only able to identify 3 that use resources on the public lands. The users are out there and so are the Federal resources but no one is using them. It seems pretty obvious that something is wrong." According to Mr. Rafferty, the high cost of direct use royalties was the most commonly cited problem at a recent meeting held to discuss how to expand geothermal energy use in the West.<sup>5</sup>

Jim Witcher of New Mexico State University will present testimony today discussing in more detail the major impediments to increased direct use of geothermal energy in commercial, mining, ranching and similar operations in the West. I hope he also takes a few minutes to discuss the significant benefits direct-use facilities are bringing to the economy of New Mexico, because it is our view that the provisions of H.R. 2772 relating to leasing for direct use purposes will go a long way towards bringing new economic development to many communities throughout the West.

<sup>5</sup>Email communication from Kevin Rafferty, Associate Director, Geo-Heat Center, Klamath Falls Oregon, February 24, 2004.

H.R. 2772 seeks to encourage the use of geothermal resources by ranchers, local governments, small businesses, and others for non-electric “direct uses” (greenhouses, aquaculture, space heating, and the like) by creating a simpler leasing process for direct uses purposes with less onerous terms—terms more closely resembling those of private and state direct use leases. We support these provisions, and believe they will encourage rural economic development throughout Nevada and the West, while encouraging greater use of this environmentally beneficial energy source.

#### *Gross Proceeds Royalties*

GEA supports the proposal made in H.R. 2772 to adopt a gross proceeds royalty. The proposed legislation reflects market value, should be easy to administer and readily verifiable, and is applicable to both new and existing leases. A royalty on gross proceeds will save on the administrative costs of both the government and industry as well as eliminate many uncertainties that arise under the current system, including the potential for audits years after royalty payments are made.

We have been involved in numerous discussions about royalty methods in recent years, spurred by concerns raised by local communities several years ago when their royalty income suddenly dropped under the existing net-back royalty formulation. In public meetings with local communities, states, and Federal officials it was recognized that a significant disadvantage of the net-back formula is its volatility.

The net-back method has a significant advantage for geothermal companies because royalty payments are essentially zero during the first few years of commercial operation, which is when costs are their highest. However, the proposed legislation seeks to address this by establishing a tiered royalty, with a lower rate during the first ten years of production.

Based upon our assessment, the net present value of the royalty proposed in H.R. 2772 is very close to the value received during the first ten years under the net-back formula. For a new flash steam plant, at a 1.75% gross proceeds royalty the net present value of the payments equals payments under the net-back in about 8 or 9 years, and for a binary plant—which has higher capital costs and lower steam values—the values equalize in about 11 or 12 years.<sup>6</sup> So, the first ten year royalty tier proposed in the bill is roughly the middle ground between a flash steam plant and a binary plant.

After the first ten years of production, the legislation proposes that all power plants would pay a 3.5% royalty on their gross proceeds. This appears to represent a fair figure, and comports with what is often used as the “rule of thumb” for geothermal power plants: that one-third of the value of the output is derived from the steam or hot water. In discussions with the geothermal operators, it appears that because the net-back method allows a wide range of variations actual royalty rates of existing leases span a wide range, from 1% to 5.5% on a gross proceeds basis. In general, the higher values are represented by The Geysers in California, which is a very high value and unique dry steam resource. Virtually all other geothermal resources in the United States have lower energy values than The Geysers.

The proposed gross proceeds royalty would require geothermal operators to pay royalties sooner—beginning in their first year of operation—and might be somewhat higher than they would pay under current net-back rules. But, the geothermal industry would support changing to a gross proceeds formula as proposed because of its other benefits.

The gross proceeds approach benefits both the company and the state and local community. The approach is simpler, more predictable, and less bureaucratic. Companies and communities would be able to plan with more certainty. This is very important when royalties are an important source of income supporting schools and community services. Neither the counties, nor the geothermal companies, benefit when sudden swings in electricity prices cause shortfalls in local government income. Neither the counties, nor the geothermal companies, benefit when audits undertaken years later determine that a company has underpaid or overpaid—and now one party or the other has to suddenly find funds that are not in their budget.

H.R. 2772 also proposes to authorize the Secretary to give companies royalty credits where they enter into an agreement with a state or county government for the in-kind sale of electricity. In some instances this could double or triple the value of the royalty to the local government. It also provides a near-term royalty incentive for production from existing leases, including an incentive to expand production from existing geothermal sites within the next four years. This will encourage new geothermal power production to help meet the regions urgent supply needs.

<sup>6</sup>For data on royalty payments from a flash steam plant see published study by Dr. David Gallo of California State University available at <http://www.csuchico.edu/cedp/images/pdf/esp.calpine.pdf>. Information on binary power plants from Dan Schochet, Ormat International.

#### *Agency Cooperation*

H.R. 2772 directs specific coordination steps between the Forest Service and BLM regarding leasing, processing and permitting on the public lands. Forest Service lands in the West hold thousands of megawatts of geothermal potential, but the lack of clear administrative procedures and timeframes has lead to years of delays in decision making on land otherwise open for such development. We support these provisions.

#### *Moratoria and Withdrawals*

H.R. 2772 directs a review of moratoria and withdrawals from geothermal leasing on public lands, and ensures that Congress and the Secretary of Interior have oversight over such closures. We support this provision.

#### *Reimbursement for NEPA Costs*

H.R. 2772 authorizes a process for lease applicants or leaseholders to fund necessary government studies or documents where the BLM lacks adequate funds to prepare them. In many instances inadequate staffing and funding has resulted in a de-facto moratorium on geothermal development. This proposal would introduce a way to address this problem, at least in some circumstances, while retaining BLM control over the integrity of its process. While we support this provision, we believe that it needs to be administered with attention to the problems inherent in using private funds for these purposes. The Secretary needs to both ensure integrity of the government processes and avoid creation of unnecessary or additional studies or other documents.

#### *National Resource Assessment*

H.R. 2772 directs the U.S. Geological Survey, in cooperation with the states, to complete a new national geothermal resource assessment within three years of enactment. The USGS has not conducted a geothermal resource assessment in 30 years, and significant changes in science and technology have occurred over those three decades. Many consider a new geothermal resource assessment essential to achieving the tremendous potential geothermal holds for both energy and economic development in the West. We support this provision, encourage Congress to ensure that funds are made available for this assessment, and applaud Rep. Gibbons for including a specific directive for the USGS to conduct this work in cooperation with the states.

#### *Unitization*

H.R. 2772 would provide clear authority for BLM to establish cooperative units where the ownership of an undeveloped geothermal reservoir is fragmented between multiple parties. Fragmented ownership is a major impediment to new development of geothermal resources, and this bill borrows unitization and pooling language from the oil and gas laws that has proven successful in addressing this problem.

BLM has had pending for several years regulations in this area, and we believe that the language proposed in this legislation is consistent with their proposed rules, and will give them a firm statutory basis. In addition, this proposal directs the BLM to consult with the states in managing lease unitization and pooling activities, and to treat any state leases included in such arrangements fairly.

#### *Royalty on By-Products*

H.R. 2772 addresses a disparity in existing law that discourages mineral production from geothermal sites. Mineral production from geothermal sites should be treated the same as mineral production elsewhere on the Federal lands. It is sadly ironic that under the existing law a Federal lessee producing metals from the fluid used in a geothermal plant would have to pay the Federal Government a royalty on the mineral (in addition to a royalty on the power), but producing that same metal by open pit mining on the public lands would not be subject to a royalty. There is significant potential to produce minerals from geothermal sites that should be encouraged. Doing so will not only help the economy and national security but will reduce the overall environmental impacts of mineral production.

#### *Lease Duration and Work Requirements*

H.R. 2772 provides a clear statutory framework for lease duration and development obligations of lessees. While these changes will increase the payments due from Federal lessees, and increase work requirements, we believe they are fair and that, by encouraging production, they will benefit the geothermal industry.

We are particularly pleased that the legislation proposes to clear up a problem with the inflexibility of existing law regarding late rental payments. The bill provides a 45-day notification and reinstatement period for any cases where a lease

rental payment is not made in a timely manner. Under existing law an inadvertent error can undercut efforts to achieve production by forcing premature lease cancellations.

#### *Military Lands*

There are millions of acres of public land in the West that are reserved for use by the military. These lands potentially hold significant geothermal resources. GEA fully recognizes the importance of the military's use of public lands, and believes that leasing or development should occur on military lands only with their consent, and under such terms and conditions as they deem necessary and/or advisable to meet the military mission.

In our testimony before the Resources Committee in March, we stated our views that where development occurs, geothermal leasing and development on lands subject to military reservation there should be: (1) Uniform policies on securing and maintaining the leasehold estate; (2) Uniform royalty structures and consistency with policies affecting development on non-military lands; and (3) Centralized administration of the lease and royalty programs.

In other words, we were urging that standard, uniform policies be developed regarding leasing and royalties on military lands so that a potential developer knows what to expect. The current situation, which allows ad-hoc decisions to be made on a case-by-case basis, deters geothermal development on military lands. Essentially, we believe geothermal resources should receive treatment similar to other oil, gas and mineral activities on military lands.<sup>7</sup>

H.R. 2772 would place geothermal development on military lands under the same lease terms as development on other public lands, which we believe will encourage geothermal production from military lands where such uses can be made compatible with military purposes. Under the existing law, which provides a separate military development scheme, there has been little new development on military lands in over 20 years. We support these provisions, and wish to point out that the legislation provides explicit authority for the military departments to close lands where necessary and impose such terms and conditions on geothermal operations as they deem necessary. These are important safeguards that we believe are essential to ensuring that geothermal development does not in any way diminish or interfere with military mission.

#### *Conclusion*

Geothermal resources on the public lands can contribute significantly to our Nation's energy supplies. We urge this Committee to support H.R. 2772, the John Rishel Geothermal Steam Act Amendments of 2003. Enacting these amendments into law would help encourage new geothermal production, streamline administration of the law, and take other important steps to achieve the potential our geothermal resources hold to help address the critical energy problems of our Nation. This would reduce our dependence upon foreign oil, reduce our spiraling demand for natural gas, and provide a substantial and immediate stimulus for the economy.

Thank you.

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<sup>7</sup>See 43 U.S.C. 158. The Engle Act of 1958 placed mineral resources on withdrawn military lands under jurisdiction of the Secretary of the Interior and subject to disposition under the public land mining and mineral leasing laws.

**Attachment #1****Table #1****STATES USING GEOTHERMAL RESOURCES TODAY**

(Source: Geo-Heat Center, Oregon Institute of Technology)

Alabama  
 Alaska  
 Arizona  
 Arkansas  
 California  
 Colorado  
 Georgia  
 Hawaii  
 Idaho  
 Louisiana  
 Mississippi  
 Montana  
 Nevada  
 New Mexico  
 New York  
 Oregon  
 South Dakota  
 Texas  
 Utah  
 Virginia  
 Washington  
 West Virginia  
 Wyoming

**Table #2****GEOTHERMAL ELECTRIC PRODUCTION POTENTIAL**(Based Upon US Geologic Survey Testimony<sup>8</sup>)

Alaska	250 MW
Arizona	1,000 MW
California	12,000 MW
Hawaii	250 MW
Idaho	540 MW
Nevada	2,000 MW
New Mexico	2,700 MW
Oregon	2,200 MW
Utah	1,350 MW
<b>TOTAL</b>	<b>22,290 MW</b>

**ADDITIONAL STATES WITH GEOTHERMAL ELECTRIC POTENTIAL:**Colorado, Montana, Washington, Wyoming<sup>9</sup>

<sup>8</sup> Testimony of the U.S. Geologic Survey before the Subcommittee on Energy and Mineral Resources of the House Resources Committee, U.S. House of Representatives, May 3, 2001

<sup>9</sup> NOAA survey shows "hot" geothermal resources in these additional states where conventional technology could produce electric power. The 1978 USGS Survey, upon which the testimony noted above is based, did not review all states due to limited resources.

Mr. GIBBONS. Thank you very much, Mr. Gawell. I appreciate your kind remarks. And I am sure John Rishel would have appreciated them as well. He worked very hard on this legislation. I am sure in some way he has heard them.

With that, we will turn to Dr. James Witcher, New Mexico State University. And doctor, the floor is yours. Welcome. We are happy to have you and look forward to your testimony.

**STATEMENT OF JAMES WITCHER,  
NEW MEXICO STATE UNIVERSITY**

Dr. WITCHER. Thank you, Congressman Gibbons. It is my pleasure to talk to the Committee on H.R. 2772, The John Rishel Geothermal Steam Act Amendments.

My testimony will cover direct geothermal use, and is something that is a little different than most energy that is out there. One of the factors that makes it different is the fact that the people here who are doing this are not in the business to sell energy as their sole business. Usually, they end up being a farmer or a grower, as it would be in a greenhouse or they have a large business or something like that that they need to space heat, and so they use this to save energy, energy costs.

What I would like to discuss is the State of New Mexico, in terms of how geothermal energy is extremely important in direct use, in terms of rural economic development. In New Mexico, we have four geothermally heated greenhouses with a total acreage of 50 acres. This acreage represents half the large wholesale commercial acreage that is used in New Mexico, which is a significant number in itself, but probably as important, is this greenhouse acreage brings in \$12 million in gross receipts each year. That makes it ranked among the top 10 in agricultural gross receipts sector in the State. So, when you look at geothermal greenhousing as a direct use in rural economic development, it becomes very important.

Another way of looking at this is that these greenhouses, two of them, which were the larger ones, one of them represents the largest economic tax base in the county it is in. The other represents probably the largest tax base in the Northern part of the county that it is in, and this results in about 250 new jobs that have been created in the last 50 years and with a payroll of probably \$4 million annually.

One of the things that has been inhibiting geothermal greenhouse development in New Mexico has been not the leasing so much as it has been the royalties and how these are figured.

With the geothermal greenhouse, one of the operators in New Mexico has been required to place BTU meters on his wells. These BTU meters have ended up costing as much as it cost him to actually drill one of his production wells with the casing and the production pump. So it becomes something that is very prohibitive to a greenhouse operator. When you look at a lower temperature geothermal resource, the equipment that you have to use to heat a greenhouse ends up costing more than, say, if you're using a higher temperature geothermal resource.

And so when you have just a straightforward royalty placed upon that and have to have BTU meters, the person that wants to place the greenhouse in operation with lower temperature, the royalty may actually end up cutting into any savings that he would have gotten by using geothermal, and so it is an impediment.

I would like to end up with stating that I think that H.R. 2772 is also very important in terms of the leasing changes that will

occur, and one is that a direct-use operator is not subjected to the minimum acreage rule that he would be currently. If you are needing to build a, say, a 40-acre greenhouse, you are not going to need the 256 acres of geothermal resource leased to heat that greenhouse, and so this encourages that sort of development.

And the other fact is that the H.R. 7272 provides a simple and really a remedy to the current geothermal royalty rules that a direct-use operator would have, and it streamlines it, and it makes it easier for the BLM to administer this so that you don't get into conflicts administratively between the operator and the Federal officials that are collecting royalties and overseeing the leases, and it places the geothermal greenhouse operator into a situation where he can pay a fee, like most other people, a direct fee, a straight fee like most other people would pay if they were leasing Federal property or land for use.

With that, I urge the Committee to support H.R. 2772, and I thank you very much for the opportunity to testify before you today.

[The prepared statement of Dr. Witcher follows:]

**Statement of James C. Witcher, Southwest Technology Development  
Institute, New Mexico State University**

Thank you for the opportunity to present testimony regarding H.R. 2772, The John Rishel Geothermal Steam Act Amendments introduced by Rep. Jim Gibbons (R-NV). My testimony reflects two decades experience in geothermal resource evaluation, exploration, and development for direct-use geothermal heating in the Southwest. As geologist and project manager with the Southwest Technology Development Institute (SWTDI) at New Mexico State University (NMSU) in Las Cruces, I have had the pleasure and privilege of working with most of the geothermal direct-use projects in New Mexico (NM). As a result, I have gained an appreciation for the concerns and requirements of a successful direct-use geothermal operation.

*Importance of Geothermal Direct-Use*

Geothermal resources suitable for direct-use generally have lower temperature and represent a very large resource base in terms of the number of potential use sites, especially in the West. I will discuss NM geothermal as an example of the importance of direct-heat utilization.

Besides spas, direct-use geothermal applications in NM include space heating, district heating (NMSU campus), large commercial greenhouses, and aquaculture (fish farming). I will focus on the commercial greenhouse sector.

Four NM greenhouse growers use geothermal energy to heat about 50 acres. This acreage represents more than half of the wholesale commercial greenhouses in the state. Gross sales are estimated to exceed \$12 million annually, placing geothermal greenhouses among the top ten agriculture sectors in the State. Most of this acreage has been built in the last decade. Approximately 250 jobs have been created with an estimated payroll more than \$4 million annually. The two largest greenhouses and an important aquaculture business are in rural areas and the greenhouses are among the largest businesses and tax base in their respective localities.

While the geothermal greenhouses require more than 275 billion BTU per year of geothermal heat and accrue a net savings in energy costs when compared to local conventional fuel, it is clear that geothermal direct-use also provides important economic development in rural areas that are often left behind by the flow of money and people to population centers.

Greenhouses and aquaculture are not the only potential agriculture or industrial user of geothermal in NM. I believe that processing of chile, onions, milk, and cheese may someday benefit from geothermal direct-use.

I have only outlined the direct-use development and potential in NM; however, important geothermal direct-use development in the agriculture sector is also occurring in the rural areas of Nevada, Utah, Idaho, California, Idaho, and Oregon. In fact, I believe that all of the western states and some other states to the east have significant direct-use geothermal potential.

### *Impediments to Geothermal Direct-Use*

Individuals and companies using geothermal direct-use are somewhat unique among the nation's energy producers. A direct-use operator normally does not develop the geothermal resource for energy sales as the sole or major business revenue. A geothermal greenhouse or aquaculture operator is a grower or farmer first.

"Location, location, location," as often quoted in real estate, is first and foremost in starting a geothermal direct-use business. Irrigation water, labor, markets, transportation, and geothermal all need to coincide. Certainly energy availability and cost of energy can rank high. Aquaculture and mining operations, using hydrometallurgy, in a colder climate may require geothermal heat to have economic viability. However, in each of these cases the main purpose of business is not energy sales (or energy use).

Except for the mining example, these firms will not have a person with leasing expertise, engineers, geologists, and accountants, trained in the details of the Minerals Management Service (MMS) reporting forms and rules, on company staff.

With this thumbnail sketch of a direct-use geothermal businesses, it is clear that several things are required for viable geothermal direct-use. First, geothermal has to be economic for the intended direct-heating purpose. Second, resource accessibility and assurances of continued accessibility are required. Third, fees and rules governing geothermal use must be simple and straightforward.

Out of hundreds of direct-use geothermal endeavors, only three are identified as using the Federal geothermal resource according to Kevin Rafferty of the Geo-Heat Center, Oregon Institute of Technology, Klamath Falls, Oregon. Two of these direct-use geothermal businesses are in NM. Another direct-use operator in NM has a Federal geothermal lease and a viable, but shut-in, production well just over the fence from his large commercial greenhouse located on private land. The later geothermal operator currently chooses to pump from a private geothermal reservoir with lower temperature than from the adjacent and hotter Federal reservoir.

I believe the current royalty structure is the main obstacle with Federal direct-use geothermal in NM. In order to use the Federal geothermal resource, expensive BTU metering is required (BTU or Btu—British thermal unit—a quantity that is equivalent to heat a pound of water 1 degree F). The cost for equipment, installation, testing, and maintenance of BTU meters at one NM geothermal greenhouse exceeds the cost of a geothermal production well, including drilling, casing, and pump. Finally, there is no recognized standard for BTU metering of geothermal direct-use wells which means that one geothermal operator may not be metered the same as another, depending upon equipment brands, method of installation, and personnel performing installation and testing.

Another drawback of current royalty structure, based upon the ten percent avoided cost of the least expensive locally-available fuel, is that it does not account for any uniformity in either the avoided fuel cost or in the way the geothermal itself is valued.

Geothermal potential in a rural area that uses bottled gas (propane) because of a lack of access to less expensive pipeline gas is jeopardized by the current royalty structure. In fact, in such a case, it is likely that the only reason a greenhouse would be built in an area with high conventional energy costs is because geothermal is available. This argument can apply to other direct-use geothermal applications such as ice removal from a large bridge.

A geothermal operator that uses 140 degrees Fahrenheit water for direct-use heating will have significantly greater investment in wells, heat distribution, and operating costs than the geothermal operator that uses 210 degrees Fahrenheit geothermal water to obtain the same useable BTU. The real value of the geothermal BTU is therefore different from place to place.

Current royalty rules do not account for the discrepancy in the value of the geothermal from place to place and as a result discourages development of the lower temperature resource base because the royalty may be as great as the benefit (cost savings) that the direct-use operator would accrue from geothermal direct-use.

Direct-use geothermal and geothermal electricity are treated with different valuation philosophy. Power production royalties are calculated based upon sales or energy output with specified deductions or "netback" for power transmission and conversion of geothermal into saleable and marketable electricity. With direct-use, the current royalty structure begins with energy input at the wellhead without taking into account relative costs for pumps, heat exchangers, and heat equipment inside the greenhouse to obtain a usable BTU.

Direct-use geothermal is penalized even further when one considers that hot water from a conventional gas-fired boiler has less heating equipment cost inside a greenhouse than with geothermal because of generally higher heating loop tem-

peratures. However, the current approach adds a boiler inefficiency factor in calculating the equivalent conventional fuel cost for royalty evaluation.

*H.R. 2772 and Geothermal Direct-Use*

H.R. 2772 encourages the use of the Federal geothermal resource base for direct-use applications. Where the geothermal resource is potentially feasible to use and meets the first development hurdle of basic economics, H.R. 2772 greatly assists the leasing processes for direct-use by eliminating the minimum lease acreage requirement. While direct-use geothermal operators may dislike the sixty-day publication requirement of a direct-use lease application, I believe that this is not onerous as many permits already require publication.

H.R. 2772 provides a fair and simple remedy to current royalty problems for geothermal direct-use. Because geothermal direct-use operators are not in the energy business as their prime business, the simplified fees eliminate many problems and allow for more streamlined administration of Federal land by the Bureau of Land Management (BLM) and provide direct-use developers a fee structure that is known upfront. Some may argue that a fee or royalty based upon business sales should be implemented to replace the current royalty structure. I would argue that the benefit derived from geothermal use would accrue in the form of a larger tax base, higher employment, and a cleaner environment.

*Conclusion*

Experience in NM shows that geothermal direct-use development has significant potential for environmentally clean, rural economic development in all states where suitable lower temperature geothermal resources exist, while at the same time reducing dependence on foreign energy supplies.

I urge the Committee to support H.R. 2772, the John Rishel Geothermal Steam Act Amendments of 2003. It is my belief that by enacting the amendments into law, much desired, but currently avoided, geothermal direct-use development on Federal public lands will begin to take form.

Thank you.

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Mr. GIBBONS. Dr. Witcher, thank you very much for your testimony, indeed. You have shed new light on the understanding of geothermal energy, especially in the direct use field, that I think many of us had not understood or even thought about at this point in time, so your testimony has been very helpful.

We turn now to Jeanne Connelly from Calpine. We want to welcome you to the Committee, and we look forward to your testimony.

Ms. Connelly, the floor is yours.

**STATEMENT OF JEANNE CONNELLY, VICE PRESIDENT,  
FEDERAL RELATIONS, CALPINE CORPORATION**

Ms. CONNELLY. Well, thank you, Mr. Chairman, for inviting Calpine to participate in the hearing today. We have a great interest in geothermal energy because Calpine is the largest geothermal producer in the United States. We have approximately 900 megawatts of geothermal power at a place called The Geysers in Northern California, and we are also in the process of developing two additional geothermal projects in an area called The Glass Mountain Known Geothermal Reserve Area. That is in Siskiyou County, California, way up in the Northern part of the State on the Oregon border.

This Subcommittee actually heard previous testimony from Calpine about 2 years ago about the extraordinary delays that we had encountered in trying to permit those two projects at Glass Mountain. At that point, I looked back at our testimony, and we had spent 5 years and over \$3 million trying to develop our project to Glass Mountain, and we are still unable to proceed.

There have been some positive developments since that time. This administration's national energy policy recognized the importance of geothermal as a key renewable resource. And since that time, the Departments of Energy, Interior and Agriculture have all taken steps to improve the process.

The bill before the Subcommittee today will go even further to promote the development of this clean, renewable resource. As my colleague, Karl Gawell, has pointed out, the potential for geothermal is just tremendous in the Western part of the United States, and we believe H.R. 2772 will definitely encourage future production.

There are many positive provisions in the bill—too many to be able to address them all today, but I wanted to discuss just a couple areas where Calpine has had some specific experiences.

First, we strongly support the proposal to require leases within a reserve area to be leased as a block and to move to a competitive leasing. The Geysers was originally in the hands of many multiple donors, and it created tremendous problems for the resource. One party would drill a slanted well right on their property line, hoping to tap into their neighbor's resource, and there was no overall management and no overall planning of the resource itself, which ended up harming the sustainability of the resource.

Since we have been able to acquire most of the leases and consolidate the ownership at The Geysers, productivity has improved and sustainability of the resource has improved.

We are also looking at other potential geothermal development projects, and when we look around the West, we see fragmented ownership as a serious potential barrier to that development. Without consolidated leases, the negotiations with the individual owners on these sometimes very small parcels could go on forever and might never reach resolution.

We also support the proposal to move to a gross proceeds royalty, and again our experience at The Geysers is useful. The State of California was using a similar formula, so some years ago we went to the Department of Interior, and we asked if we might have some kind of move to gross proceeds royalty at The Geysers so that it could be more compatible with what the State of California was doing, and we worked out an agreement with the Department of Interior to place our leases at The Geysers under the system.

The result has, we believe, significantly reduced administrative costs, both for us and for the Government. The formula is so much simpler, and you avoid those audits of what is an allowable cost, what is not an allowable cost. So I think everyone has benefited.

It also should improve the predictability of income flow to the local jurisdictions that depend on royalties, and in many places where you find the geothermal resource, they tend to be very rural areas in great need of economic development, so it becomes a very important source of income.

One example of the potential revenue that can flow from geothermal is what we hope to do at Glass Mountain. In June of last year, an economist with the Center for Economic Development at California State University completed an assessment of the economic impact of our two projects on the four counties: It is

Siskiyou, Modoc and Shasta Counties in California and Klamath County in Oregon.

And he found that the total impact on real income, and it is royalties, he also included jobs and taxes, but the total impact for the four county region, if just one of our two projects were to get built, would be more than \$60 million over 30 years or an average annual of over \$2 million per year, and those numbers almost double if both of our projects were able to get built and be operating.

We also support the near-term royalty relief provided in the bill. The up-front capital costs of geothermal development are quite high and short-term royalty relief provides we think the jump start that is needed to get new geothermal development going.

Finally, while the Forest Service and the Bureau of Land Management have improved their coordination recently, we really support the direction of the legislation to require those agencies to develop more specific procedures for working together. We have certainly seen problems when they were not working together in the past, and so cooperation is an essential ingredient for geothermal development to go forward.

So, again, let me thank you for the opportunity to be here.

[The prepared statement of Ms. Connelly follows:]

**Statement of Jeanne Connelly, Vice President, Federal Relations,  
Calpine Corporation**

Mrs. Chairman and Members of the Subcommittee:

Thank you for inviting Calpine Corporation to testify at today's hearing on H.R. 2772, legislation introduced by Rep. Gibbons to amend the Geothermal Steam Act. I am Jeanne Connelly, Vice President, Federal Relations for Calpine Corporation.

Calpine is the largest producer of electricity from geothermal resources in the United States today, with nearly 800MW on-line at The Geysers in Northern California, and additional development underway near the California/Oregon border in the Glass Mountain Known Geothermal Resource Area.

The Committee is aware of the extraordinary delays involved in development of the two new sites in Glass Mountain from testimony at previous hearings. We are pleased that the National Energy Policy developed by the Administration recommended that Secretary of Interior Norton and Secretary of Energy Abraham take action to increase renewable energy production on public lands. As a result, those two agencies, as well as the Department of Agriculture and others, have initiated activities to carry out this goal. Calpine has supported these efforts and wishes to applaud the Administration for the progress it is making.

Today, the Subcommittee is considering legislation that will go even further to promote the development of new geothermal resources. We believe that there is considerable geothermal potential in the Western United States that is undeveloped and that H.R. 2772 will help encourage future production.

We applaud the proposal to move towards competitive leasing, and requiring leases within the same reservoir to be leased as a block. When we have examined areas for future development, it is clear that fragmented ownership of the resource is a significant barrier to companies interested in new development.

We also applaud the proposal to move to a gross proceeds royalty. Calpine has an agreement with the Department of the Interior which places its leases at The Geysers under a gross proceeds formula, similar to that used by the State of California for its leases. Calpine initiated discussions with the Department to move in this direction after consolidating most of the leases and production facilities at The Geysers. The change has significantly reduced the administrative costs for both Calpine and the Department of Interior, and has provided more stability for local governments who rely upon our royalty payments to provide needed public services.

The near term royalty relief provided by the bill is extremely important as new projects on untapped geothermal leases compete for power purchase agreements from electric utilities. Royalties and property taxes represent two of the three largest operating costs for geothermal power projects, behind operating personnel. The

relief will help to bring new geothermal resources into production after a lengthy hiatus.

While we believe that the Forest Service and Bureau of Land Management have improved their coordination under this Administration, we support the direction the legislation takes requiring these agencies to develop specific procedures for working together. Cooperation between the Forest Service and BLM is an essential ingredient in ensuring future geothermal development.

H.R. 2772 also establishes clearer lease terms and conditions. They support and encourage development of Federal leases, while providing companies with fair terms and the security of holding the lease as long as it remains in production. These are essential elements for investors in new geothermal projects.

We wish to express our support for H.R. 2772, and thank the Subcommittee for giving us this opportunity to present our views.

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Mr. GIBBONS. Ms. Connelly, thank you very much for taking the time out of your busy schedule to address our Committee as well.

And to all of you, I want to thank you for your presence here. I know that it may seem like there is a lot of lack of interest, but there are a lot of other things going on in Congress right now, and certainly the records will show your testimony to those who want to look at it and be available for Committee decisions. That is the critical part of your presence here today.

Let me just reverse the order and start with Ms. Connelly here and ask you, as one of the Nation's largest geothermal producers, and the fact that you have seen impediments to the processing of permits over the last many years, and of course you reflected back on Glass Mountain, 5 years, \$3 million in costs just for the permitting alone. That has nothing to do with the exploration, nothing to do with the construction of capital improvements on there to get the resource out of the ground, but just the cost of going through the permitting process, have you seen or experienced a change now or do you see things beginning to improve with regard to permitting and the processing of permits today?

Ms. CONNELLY. We have seen a definite improvement.

First of all, this administration did lift the moratorium that existed on further development at Glass Mountain which I think was a very important decision, both a symbolic decision and a practical decision, but it did send a message that this administration recognized that this was a very clean, renewable resource and one that we need to develop further.

We also saw a reversal of one decision on a project at Glass Mountain. Again, looking at the totality of our energy needs in this country and what geothermal can do to help meet those needs, I think perhaps there was more of an urgency when this administration looked at our energy situation, and that may have weighed into the decision to reverse an initial denial. So those things have been very positive.

We waited quite a long time for an appeal, an administrative appeal to be heard at the IBLA, and I understand that that backlog is somewhat shortened, but again these things take time, but it is moving in the right direction.

Mr. GIBBONS. What do you see as the biggest current hurdle today for permitting, from your perspective? Now that things are starting to move, what remains as the big hurdle?

Ms. CONNELLY. Well, I think the two things I pointed to in my testimony; the fragmented ownership and the, I would have to say

that today—this is not a permitting issue—but we have to recognize that access to capital is probably the most difficult problem for anyone who wants to start a new energy project in the United States today, and so—

Mr. GIBBONS. And that is very difficult for us in Congress to deal with.

Ms. CONNELLY. But the interesting thing is that when a bank or a financing entity looks at a potential project, when they look at the royalties that are expected to come, I think your changes in the royalty provisions provide a certainty even to potential lenders that could make a difference there.

Mr. GIBBONS. Some predictability is in there—

Ms. CONNELLY. Exactly.

Mr. GIBBONS. —which is always helpful, I am sure.

Dr. Witcher, let me ask a question of you, if I may, and it deals with technology involved in direct use versus electrical generation.

Old generation of electricity was the kind that flashed off the steam, drove a turbine, and it was vented into the atmosphere. Today, we use binary systems, direct use, et cetera. Has the technology changed for the utilization of geothermal energy for direct use over the last 10 years?

Dr. WITCHER. I do not believe the technology has really changed dramatically that much because a lot of the technology that we use for heating is off-the-shelf sorts of equipment. It would be the same sort of equipment if you had a gas-fired boiler, if we just design it a little differently for the lower temperatures and the higher flow rates.

Now, you bring up one point, though, that the binary electrical power generation, coming off that electrical binary power generation, you have a flow of hot water. So if you had 250-degree Fahrenheit water that was going into the power plant with the Delta T that may come off that, you may have water that is coming out of there at 180 degrees Fahrenheit.

Now, what you can do with that water at a power plant such as this is cascade that water down into a direct use application; for instance, heating a large building space, heating a large building or even a commercial greenhouse or an aquaculture facility, and this may be certainly something that would be a real melding of the binary geothermal technology and direct use, where you have only a small amount of power that is being produced, where you may not place it on the grid, but you use it onsite and use it in your direct use geothermal operation.

Mr. GIBBONS. Doctor, just for the record, let me state that Delta T stands for the difference in temperature from when it came in to when it goes out. So it would be 250 minus whatever it takes to get to 180.

Dr. WITCHER. Yes, sir.

Mr. GIBBONS. So that is what you call Delta T. That is because not everybody here would understand what Delta T is. They talk in acronyms here as well, but not necessarily scientific ones.

If you wanted to use, Doctor, a direct application of the resource after it has gone through, electrical power generating facilities, which are oftentimes not co-located next to communities, how close does that resource have to be to the end user to be valuable, to be

a resource that can be utilized for a direct use? In other words, does the direct application have to be co-located at the source or can it be miles away.

Dr. WITCHER. Ideally, the direct use application would need to be collated directly onsite. We use geothermal energy to heat the Eastern part of New Mexico State University, and we do pipe that water two miles down onto campus, and this is after it goes through a heat exchange process where you lose some heat, and then you lose some heat in a pipeline. We have the advantage in New Mexico of having dry soils, which allow you not to lose a lot of heat. In another climate it may be different.

I believe that a study several years ago that the Oregon Institute of Technology Geo-Heat Center performed, looking at space heating, I believe the maximum that they were willing to transport heat in a pipeline was, say, five miles. So, ideally, you would really want to have it co-located because there are heat losses in piping that water.

Mr. GIBBONS. And, unfortunately, not every geothermal reservoir is co-located with a community or a university. So you get what you get. Mother Nature put it there.

Mr. Gawell, thank you for your testimony. What is the single greatest factor in your mind that keeps geothermal energy from reaching its potential in the United States?

Mr. GAWELL. I think at the moment the biggest obstacle that the geothermal industry faces, and again I represent largely the power industry, and I think Jeanne Connelly hit on this, is the cost of capital, the cost of investing in a new plant, geothermal power plants, bad news, as they are three times or more as expensive as a comparable natural gas plant. So you have to get an investor who is willing to put that money down up front.

That means he is going to look at all of your risks, all of your uncertainties, and he has really got to be convinced it will work. The good news is you do not pay for fuel.

Mr. GIBBONS. Right. How long would you expect a geothermal plant to be on-line producing. In other words, if we are looking at royalties, somewhere down the road, we are going to have to say that we are going to be in a position where we are going to pay a higher royalty, and we want to know how long we are going to be in that position paying a higher royalty over a certain period of time to make it worthwhile for the U.S. Government to say that, yes, we want to encourage you to start a power plant today at a lower royalty, knowing that, over this many years after that, we are going to get a higher royalty, which makes it attractive and an incentive for the U.S. Government to do that. How long do you expect power plants to be on station using geothermal?

Mr. GAWELL. Well, that is a question I actually get asked quite a bit, and there have not been plants shutting down in this country yet. That plant at The Geyser has been operated since 1960. Plants in Italy have been operating since 1917. The Department of Energy states that it looks at optimizing plant design for 100-year life at the moment.

Mr. GIBBONS. So the only restriction would be on the resource below the ground.

Mr. GAWELL. Right.

Mr. GIBBONS. If that, for some reason, cooled, which probably wouldn't ever happen even in Mother Nature's lifetime—

Mr. GAWELL. You are looking at the major variable is the resource, and in fact if The Geyser is there reinvesting in their resource by reinjecting treated, reclaimed water, in effect, bringing back the pressure, they think they can maintain that resource indefinitely by doing that.

Mr. GIBBONS. So proper management, which this bill goes toward, management of that resource, is the ideal way to create an almost inexhaustible source of a resource for energy production.

Mr. GAWELL. Absolutely. And I want to note that while your H.R. 2772 proposes a two-tier royalty, it actually is not a lesser royalty, because when you compare it to the net back, it is essentially the same royalty. Because the way the net back works is it allows you to take your costs and amortize them. So it is sort of like doing a separate tax form. So, in the first three to 4 years of production, under net back, your royalty is usually zero. In fact, in the Chico State study Calpine did, that is exactly what it said.

So the lower tier base that compensates for that, and on a net present value basis that first 10 years is essentially the same payment, and so you are lower tier, but comparable to today's royalty, you are paying the same rate, but you do not want to discourage new production. So you do not want to pay the full rate all the way through it, so that it compensates.

Mr. GIBBONS. And that is the purpose of the legislation is to provide incentives for those people that have the opportunity to go out there and invest their capital in a clean, energy-producing system, to have some encouragement through the incentive of a two-tiered royalty to do that.

Mr. GAWELL. Exactly.

Mr. GIBBONS. And hopefully do you—well, let me ask this question. Strike the “hopefully.”

In your opinion, do you see the two-tier royalty having an effect on the ability to raise capital for geothermal steam generating plant?

Mr. GAWELL. I think the point is it gives you much more certainty all the way around, in terms of what you are going to be paying and that does eliminate, every time you can eliminate uncertainty with a large investment, the more likely you are to get the investors on board. Yes, I think it will encourage investment in new plants.

Mr. GIBBONS. You talked a little bit about mineral production. Not all geothermal wells, I am sure, have minerals that are capable of being extracted at some point from the resource—some are. How extensive is the mineral production from geothermal sites today, and what do you see as its potential because I am looking at something called strategic minerals, and we have a certain stockpile of strategic minerals for national security reasons that have to be acquired from geopolitically unstable countries that put into big question our ability to have those minerals available to us throughout the period of time we may need them, and most of time that is during a crisis when they would not be available.

Mr. GAWELL. Right.

Mr. GIBBONS. So how do you see geothermal being able to contribute, through the mineral extraction process, to our strategic mineral resource needs?

Mr. GAWELL. My understanding of this is largely based upon what I have learned recently from the Department of Energy, but also I have talked with the companies that are producing minerals. You have one site in Nevada, the site owned by Caithness in Dixie Valley, where they had begun experimentally producing a very high-grade silica product. This wasn't silica—silica has various grades—this was pharmaceutical-grade silica that came out of their resource, and it has very high value. You get silica in most geothermal reservoirs, but at different grades.

Mr. GIBBONS. Usually, it clogs up your pipes is what it does.

Mr. GAWELL. Exactly. And down at the Sultan Sea in Southern California, the fluid there has hundreds, I mean just it comes through almost, it does not even want to flow it is so viscous, but the Department of Energy has done some studies, and we could give you for the record a study that was done by Princeton Economic Research that looks at this. They looked at a half-a-dozen different sites, and each of those sites, there was at least half a dozen different minerals that could be produced.

So there clearly is a wide range, and just this morning I took their research and looked at the high-value ones they had named, which I had mentioned earlier, and pulled up the USGS on-line, and in every single case, the majority of that mineral to the United States comes today from imports from overseas.

Mr. GIBBONS. Sure.

Mr. GAWELL. So I think it could be a tremendous benefit. Particularly what may be uniquely interesting is some of the rarer elements, like the rare earth elements, which are growing in their demand in all of the high technology fields. And, for example, I understand a number of the rare earth elements are critical to some of the processes being considered in hydrogen conversion. And so they may play very unique roles in the future.

Mr. GIBBONS. Is beryllium a mineral you find in geothermal wells?

Mr. GAWELL. I would have to ask an expert.

Mr. GIBBONS. Fine. Let me ask a question that a cynic would ask. Now, we are talking about mineralization here.

If you were applying for a geothermal lease, and you pay a royalty on the geothermal end result, which is the electricity, do you also pay a royalty on the minerals you extract because geothermal is a mineral? So this is the first time royalties are going to be paid on minerals. You would pay a royalty on the minerals you extract from a geothermal well as well; is that not correct?

Mr. GAWELL. Under current law, all minerals that you produce from geothermal sites, Federal land would be subject to the same royalty as power. Under 2772, you put minerals under the terms they would otherwise go under. So if it was a leasable mineral, it would pay a royalty; if it was a locatable mineral, it would not. So most of these are metals, most of them are locatable minerals, so they would not.

Mr. GIBBONS. So, today, under the strict Mining Law of 1872, there is no royalty on producing a mineral.

Mr. GAWELL. That is correct.

Mr. GIBBONS. There is a royalty on producing a mineral from geothermal waters.

Mr. GAWELL. That is correct.

Mr. GIBBONS. So it does benefit the Government to have a lease for geothermal, even if the person is going to go in there and take minerals out of it.

Mr. GAWELL. That is correct.

Mr. GIBBONS. Is the production of minerals from geothermal a risky and expensive way to produce them? I mean, if you were not going to have the geothermal electrical or energy supply, would just be going in after the minerals be a very expensive and risky way to produce those minerals?

Mr. GAWELL. I am not sure it is risky in the sense of injury to people.

Mr. GIBBONS. Well, the technology is there so you could say you could do it.

Mr. GAWELL. Yes, it is technologically, is it risky? It is risky because it requires a lot of money up front, an frankly the best way to do it is the way it is being perceived. Back in the Salton Sea, where you have got the power production, that gives you the economic base—

Mr. GIBBONS. Right.

Mr. GAWELL. Then, move toward the mineral production. It is fairly difficult. Some very large companies—Morrison-Knudsen and others—years ago had looked at major mineral production from geothermal resources. It is only now are we starting to see it at one site in Nevada and at the Salton Sea in Southern California, where they are producing zinc.

CAL Energy is looking at a major zinc operation, and in fact I know that they for years, Magma before them, and CAL Energy now, believed that the Salton Sea will someday be a greater mineral production source than an electricity source.

The potential is there, but they see it working best economically by coupling the two together because then you get the revenue from the electricity side—

Mr. GIBBONS. Which helps you process.

Mr. GAWELL. It allows you to help you process. It also helps you absorb some of the risk because there are some real technological uncertainties. I mean, there is no secret they are having difficulties with their zinc process. There is a number of both chemical and physical problems they have to work through to be able to separate out the minerals, and the first time you do anything, you are going to run into some problems, and they are, but they feel very confident they can overcome them and move forward.

Mr. GIBBONS. Thank you.

Dr. Witcher, let me ask a question about BTU meters on direct geothermal resources.

Is there an alternative for some way to deal with a direct application of geothermal energy without having to go through the direct, if it is going to be applied to a commercial establishment, the utilization of BTU meters, which are very expensive for that low temperature resource which most direct applications use, is there an alternative to that?

Dr. WITCHER. One alternative that was tried in New Mexico and is done currently with royalties on State land for geothermal resource is that a formula was developed that it is basically an engineering estimate of what the heat use of that greenhouse would be on an average annual basis, and then they use that to pretty much do an equivalent 10 percent royalty on what that would be equivalent with natural gas. And so that is how the formula was applied.

It works where it is done right now on State land.

Mr. GIBBONS. Doctor, have you compared that process or that procedure that you have done in those experimental State geothermal resources to the BTU monitors that are on Federal geothermal resources?

Dr. WITCHER. Well, the comparison would be that the person that has the State lease also has the BTU meters.

Mr. GIBBONS. I would assume that—

Dr. WITCHER. And so he goes to the State lease to produce. The BTU meters adds an incredible experience in comparison with what he is actually getting out of the cost savings, but the other part of that is, is that he knows from year-to-year what his royalty payment is going to be. He knows what his payment is going to be. It is not something that is going to fluctuate, and that fluctuation can of course be done with the rising fossil fuel costs or lowering of fossil fuel costs. It can also be maintenance just keeping the BTU meters working.

Mr. GIBBONS. Is there any provision to provide a credit where people voluntarily use green energy or green resources for not producing carbon oxides or nitrous oxides, whatever combustion creates into the atmosphere? I mean, there ought to be some way that we encourage commercial users that use a direct geothermal application from not turning to a less expensive, say, natural gas heat. It seems to me that we are trying to defeat the purpose we are going for, clean, renewable energy resources.

Would you agree that there ought to be some consideration given, then? I guess that is my better question than the way I poorly put it before.

Dr. WITCHER. I think a consideration of a green credit would be very useful. I really cannot tell you how it may spur development with direct use or even electrical power, but—

Mr. GIBBONS. I guess when you get down to choices, and the two are weighing very closely together, the better choice would be to use clean geothermal energy versus a fossil fuel energy source, which then has an atmospheric component to it. So I guess that would perhaps weigh differently. In my view, it would for this system.

Let me finally turn to Ms. Connelly, and ask basically, when you look at what your industry provides to a community, and you said just even at Glass Mountain or whatever, I think \$2 million a year to the community for direct economic benefit of having a geothermal plant in the area.

When you look at jobs, what average salary would you say the geothermal energy employee brings in? I mean, in mining, it is \$56- to \$60,000 a year, an enormously different perspective on the average salary than compared to service industries, which are in

the 20's in Nevada. So what kind of average salary does a geothermal energy plant employee bring?

Ms. CONNELLY. I do not have the actual numbers. Maybe Karl does or, if not, I can get it, but I know that they are all, on average, high-paying jobs. First, the construction jobs that are the first jobs created are usually very skilled workers. There was a time at the top of our economic growth period where we could not even find the skilled construction workers we needed to build power plants, and we were out there trying to train people because there were not enough people with the skills.

So those jobs pay very well, and then the actual operating jobs are again technical and skilled in nature, and so, because of just the very nature of the job and the requirements, they will be high paying. I do not know, Carl, do you have any actual average numbers?

Mr. GAWELL. I am just trying to see whether ones in your Chico State Study, and I do not find one quickly, but I think we could probably inquire—

Ms. CONNELLY. I can get back to you with some average numbers, but I know that overall, especially if you look at an area like Glass Mountain, which used to be dependent on forestry, and that industry has really declined, and very few jobs have come in to take the place of forestry. Those that are there are service-oriented jobs, so it would be a very different qualitative and quantitative difference, I think.

Mr. GIBBONS. And how many jobs would you anticipate that Glass Mountain alone will bring to the community?

Ms. CONNELLY. In the first few years of the construction phase, it is usually probably maybe in the hundreds, 2- to 300 jobs. Once it is up and operating, many fewer jobs just to simply operate the power plant, maybe 25.

Mr. GIBBONS. We have a number of additional questions that I would ask our panel, when we submit them to you, if you would look at them and give us your direct, honest approach in answer to and return them to us, as soon as possible. Would that be approved by each of you?

Dr. WITCHER. Yes.

Ms. CONNELLY. Yes.

Mr. GAWELL. Yes.

Mr. GIBBONS. There are a number of questions that I have not gotten to, but I know that each of you have spent great time here out of your busy day, and we do want to get the answers to these questions as well because they help us formulate our opinion, just as your testimony has done here today, and they are very important to us, and we will submit those questions to you in writing, and we would expect an answer in writing as well.

I see no one else here that wants to ask a question. There is no one else here besides me. So, with that, I am going to again thank each of you for your presence, for your testimony, your enlightenment. It has been very helpful to us as well, and we look forward to working with each of you as we move this legislation along. If there is some issue or some idea that you may see within the legislation that you think would make it better or change to make it

more workable, we certainly would appreciate also hearing your approach to that as well.

With that, I am going to excuse each of you, with a heartfelt thanks, and look forward to a greater dependence in this Nation on geothermal energy.

Thank you very much, and this hearing is now closed.

[Whereupon, at 3:43 p.m., the Subcommittee was adjourned.]

